APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/783,018	02/23/2004	Noboru Morishita	566.43530X00	7435

24956 7590 03/07/2006		EXAMINER
MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.		FLOURNOY, HORACE L
1800 DIAGONAL ROAD		

SUITE 370	ART UNIT PAPER NUMBER
ALEXANDRIA, VA 22314	2189

DATE MAILED: 03/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	10/783,018	MORISHITA ET AL.
	Examiner	Art Unit	
	Horace L. Flournoy	2189	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>22 December 2005</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>23 February 2004</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some * c)☐ None of:

        1.☒ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>01/28/05</u>.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____ .

DETAILED ACTION

Response to Amendment

This Office action has been issued in response to amendment filed 22 December 2005. Claims 1-18 are pending. Applicant's arguments have been carefully and respectfully considered, but they are not entirely persuasive, as will be discussed in more detail below, even in light of the instant amendments. Furthermore, new grounds for rejection have been set forth as a result of the instant amendments. Accordingly, this action has been made FINAL, as necessitated by amendment.

ACKNOWLEDGEMENT OF REFERENCES CITED BY APPLICANT

Information Disclosure Statement

The information disclosure statements filed on **01/28/2005 and 02/23/2004** have been considered except as noted below:

In the IDS received on **January 28, 2005** Foreign Document **JP 2004-294642** has not been considered since it fails to comply with 37 CFR 1.98(a)(3) because it does not include a concise explanation of the relevance.

In the IDS received on **February 23, 2004** Foreign Documents **JP 2003-15931** and **JP 2002-82775** have not been considered since they fail to comply with 37 CFR 1.98(a)(3) because they do not include a concise explanation of the relevance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere* CO., 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1.   Determining the scope and contents of the prior art.
2.   Ascertaining the differences between the prior art and the claims at issue.
3.   Resolving the level of ordinary skill in the pertinent art.
4.   Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-2, 4-5, 8-13, and 15-16, are rejected under 35 U.S.C. 103(a) as being obvious

over Fujibayashi (U.S. Patent no. 6,640,291 hereafter referred to as Fujibayashi) in view

of Nakano et al. (US PG Pub No. US 2003/0051111 A1 hereafter referred to as

Nakano).

With respect to the limitation of **independent claims 1, 8-10,**

> *"A remote copy system* **[Fujibayashi discloses in FIG. 1]** *which copies data*
>
> *between a plurality of storage systems,* **[Fujibayashi discloses in FIG. 1]**
>
> *comprising: a first storage system comprising a first controller and a first primary*
>
> *volume;* **[Fujibayashi discloses in FIG.1, 102, and associated text: "Old**

Primary Storage System"] *a second storage system comprising a* <u>*second*</u> <u>*controller and a*</u> *second primary volume;* [Fujibayashi discloses in <u>FIG. 1</u>, element 103: "New Primary Storage System"] *a network apparatus which is coupled to a host computer,* [Nakano discloses in <u>paragraph [0100]</u>, "A controller 1 comprises a channel adaptor 3, for the exchange of data by a host and a remote copy destination;] *said first storage system and said second storage system, and which controls a path for accessing from said host computer to said first primary volume and a path for accessing from said host computer to said second primary volume;* [Nakano teaches this limitation in <u>paragraphs [0102] - [0105]</u>] *and a third storage system which is coupled to said first storage system and said second storage system, and which comprises* <u>*a*</u> <u>*third controller and a*</u> *secondary volume;* [Fujibayashi discloses in <u>FIG. 1</u>, element 104: "Old Secondary Storage System"] *wherein: ~~said first storage~~ ~~system stores data received from the host computer into said first primary~~ ~~volume, and sends the data stored in said first primary volume to said third~~ ~~storage system through a network; said third storage system stores the data~~ ~~received from said first storage system into said secondary volume; and when~~ ~~the data stored in said first primary volume is migrated to said second primary~~ ~~volume~~,* <u>*said first storage system migrates data stored in said first primary*</u> <u>*volume to said second primary volume in said second storage system during*</u> <u>*remote copying of data from said first or second storage system to said third*</u> <u>*storage system,*</u> [Nakano teaches this limitation in <u>FIGs. 1, 9-11</u>, and associated text.] *said network apparatus transfers an access request issued from the host computer and destined to said first primary volume, to said second*

primary volume [Fujibayashi teaches in <u>column 8, lines 13-20</u>, "coupling a first storage system to a second storage system, wherein the first storage system is destined to be replaced with the second storage system; migrating remote copy configuration information from the first storage system to the second storage system; coupling the second storage system to a third storage system remotely located from the first storage system." Additionally, Nakano teaches this limitation in <u>paragraphs [0065]-[0066]]</u> *during said remote copying of data from said first or second storage system to said third storage system, wherein said remote copying of data from said first or second storage system to said third storage system includes,* said second storage system receives, from said first storage system, management information for identifying data to send to said third storage system, said second storage system stores write data received from the host computer and the data received from said first storage system and stored in said first primary volume, into said second primary volume, and sends data determined based on said management information out of the data stored in said second primary volume, [Nakano teaches this limitation in <u>paragraph [0137] and FIGs. 8</u>, and associated text within the specification] *to said third storage system, and said third storage system stores the data received from said <u>first or</u> second storage system, into said secondary volume"* [Nakano teaches this limitation in <u>FIGs. 13 and 15</u>, "management information" and associated text within the specification]

Fujibayashi does not expressly teach the limitations cited supra by Nakano.

Fujibayashi and Nakano are analogous art because they are from the same field of endeavor, that being data replication between storage devices.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate a remote copy system of claim 1 in which a first storage system migrates data to a second storage system during/while remote copying is taking place from first or second storage system to a third storage system to arrive at independent **claims 1 and 8-10**.

The motivation for doing so would have been obvious based on the teaching of Nakano in paragraphs [0007] and [0008], *"Recently, awareness has grown of how important are the safe storage and the maintenance of data, giving rise to the expression of many demands, originating in the data storage market, for viable disaster recovery systems. Conventional means devised to satisfy these demands generally provide for the synchronous and asynchronous transfer of data between two connected data storage points. However, further market sourced requests call for the inclusion of third and fourth data storage points (hereinafter referred to as data centers), and for the construction of comprehensive, or near comprehensive, disaster recovery systems to service these data centers...The reasoning behind these requests is that so long as three or more data centers are established, even if a disaster*

strikes one of the data centers, the redundancy represented by the

storage and maintenance of data at the remaining data centers will enable

data to be recovered and will reduce the risk represented by the

occurrence of a succeeding disaster."

Therefore, it would have been obvious to one of ordinary skill in the

art at the time of the invention having the teachings of Fujibayashi and

Nakano before him/her to combine Nakano and Fujibayashi for the benefit

of having a system that can data migrate while mirroring data to obtain the

invention as specified in claim 3.

With respect to **claims 2, 11, 12, and 13,**

"A remote copy system according to Claim 1, wherein: according to an instruction

from a management terminal, said network apparatus converts access target

identification information included in the access request received from the host

computer into identification information of said second primary volume, and

sends the converted access request to said second storage system;" is disclosed

by FUJIBAYASHI in column 3, lines 39-44 and column 4, lines 47-49.

The examiner interprets the first limitation of claim 2 to mean, according to an

instruction from a management terminal the network apparatus takes target

identification information from the host and sends it to the second primary volume.

"...and according to an instruction from said management terminal, said second

storage system receives the data stored in said first primary volume from said first

storage system and stores the received data to said second primary volume, and sends

the data stored in said second primary volume to said third storage system" is disclosed in FIG. 2 and column 3, lines 39-44.

The examiner interprets the second limitation of claim 2 to mean the second primary volume receives data from the first primary storage volume and sends it to the third storage system, according to an instruction from the management terminal.

Fujibayashi discloses in FIG. 2 elements 206-214, column 3, lines 39-44, "...a connection 109 (see FIG. 1) between host processor 101 and new primary storage system 103 is established." Next Fujibayashi discloses, "In action 208, remote copy configuration information is migrated from old primary storage system 102 to new primary storage system 103..." (column 3 lines 42-44). Fujibayashi then discloses in column 4, lines 47-49, "In action 212, a remote copy function between new primary storage system 103 and old secondary storage 104 over connection 107 is started." Fujibayashi's teachings, especially that of FIG.2, anticipate both limitations of claim 2.

With respect to **claims 4 and 15,**

> "A remote copy system according to Claim 1, wherein: until, out of data written to
> said first primary volume, data to be stored into said secondary volume has been
> completely transferred, said third storage system receives said data from said
> first storage system and stores said data into said secondary volume" is
> disclosed by FUJIBAYASHI in column 14, lines 64-65.

The examiner interprets this claim to mean the third storage system receives and stores data from the first storage system until the data has been completely transferred.

Fujibayashi discloses in column 6 lines 43-47, FIG. 7, elements 710-714, "Also in action 712, the remote copy function between old primary storage system 102 and new secondary storage system 601 is started. In action 714, old secondary storage system 104 is removed after the completion of the online data migration." Fujibayashi teaches a third storage system (new secondary storage system) receives and stores data (data migration) from a first storage system (old primary storage system) until the data has been completely transferred.

With respect to claims 5 and 16,

> *"A remote copy system according to Claim 4, wherein: until, out of data written to said first primary volume, data to be stored into said secondary volume has been completely transferred, said third storage system receives said data from said first storage system to store said data into said secondary volume, and also receives said data which said second storage system is received from the host computer, from said second storage system to store said data into said secondary volume"* is disclosed by FUJIBAYASHI in column 6 lines 43-47, FIG. 7, elements 710-714 and column 5 lines 17-20.

The examiner interprets this claim to mean the third storage system receives and stores data from the first storage system until the data has been completely transferred and also receives data from the host computer.

Fujibayashi discloses in column 6 lines 43-47, FIG. 7, elements 710-714, "Also in action 712, the remote copy function between old primary storage system 102 and new secondary storage system 601 is started. In action 714, old secondary storage system

104 is removed after the completion of the online data migration." Fujibayashi teaches a

third storage system (new secondary storage system) receives and stores data (data

migration) from a first storage system (old primary storage system) until the data has

been completely transferred. Fujibayashi further discloses that, "In the online data

migration setup of FIG.1 and method of FIG.2, the host connection and the remote copy

connection are re-routed to the new primary storage system prior to the beginning of the

data migration" (column 5 lines 17-20). Since the host computer is connected (FIG.1-2)

to a first storage system (new primary storage) it transfers data between it and a third

storage system (new secondary storage system).

Claims 3 and 14 are rejected under 35 U.S.C. 103(a) as being obvious over

Fujibayashi (U.S. Patent no. 6,640,291) in view of Nakano et al. in further view of Gupta

(US Patent No. 6,779,093 hereafter referred to as Gupta).

With respect to **claims 3 and 14,**

> Fujibayashi teaches "A remote copy system according to Claim 1..." as
>
> stated supra.

> Fujibayashi, however, does not disclose expressly "...wherein: the
>
> management information, which said second storage system receives
>
> from said first storage system, further includes information managing write
>
> order of data written by the host computer; and said second storage
>
> system uses said information managing write order to manage write order
>
> of the write data received from the host computer." (Note: Fujibayashi, as

stated previously, does disclose sending management information from a first storage system to a second storage system).

Gupta discloses, "Storage areas in a replicated storage group are under the control of an application, such as application 112A or database 114A of FIG. 1, that requires write-order fidelity among the updates to the storage areas. An application such as application 112A of FIG. 1 manages data in a primary replication storage group, such as RSG 240A." (column 6 lines 40-46, FIG.1 element 112A).

Fujibayashi and Gupta are analogous art because they are from the same field of endeavor, that being data replication between storage devices.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate a remote copy system of claim 1 in which the management information that is sent from a first storage system to a second storage system further includes a write order management feature to manage write order of the write data received from the host computer to arrive at claim 3.

The motivation for doing so would have been obvious based on the teaching of Gupta in column 6, lines 49-52, "Write ordering is strictly maintained within a replication storage group during replication to ensure that each remote storage area is always consistent, both internally and with all other storage areas of the replication storage group."

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention having the teachings of Fujibayashi and Gupta before him/her to combine Gupta and Fujibayashi for the benefit of having a write order management feature to manage write order of the write data received from the host computer and sent from a first storage system to a second storage system to obtain the invention as specified in claim 3.

Claims 6, 7, 17 and 18 are rejected under 35 U.S.C. 103(a) as being obvious over Fujibayashi (U.S. Patent no. 6,640,291) in view of Nakano et al. in further view of Fellin (US PG Pub No. US 20040078637 A1 hereafter referred to as Fellin).

With respect to **claims 6 and 17,**

Fujibayashi teaches "A remote copy system according to Claim 5..." as stated supra.

Fujibayashi, however, does not disclose expressly "...wherein: data received by said third storage system from said first storage system or from said second storage system is given with a sequence number, and said third storage system stores data received from said first storage system or from said second storage system, in order of sequence numbers, into said secondary volume." (Note: Fujibayashi, as stated previously, does disclose a third storage system that receives and stores data from either a first or second storage system).

Fellin discloses, "Sequence numbers are integers, which are assigned by the source in increasing order, preferably in increments of one without gaps, to read and write requests. Separate consecutive sequences are assigned to read requests and write requests. The assigned sequence number of a write request is sent to each replica, and it is stored by the replica in association with the data item that was modified by the write request. In other words, the sequence number associated with a particular data item is the sequence number of the last write request that modified that data item" (page 2 paragraph [0014]).

Fujibayashi and Fellin are analogous art because they are from the same field of endeavor, that being data replication between storage devices.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate a remote copy system of claim 5 in which the data received by a third storage system from either a first or second storage system is given with a sequence number and stored in the order of that sequence to arrive at claim 6.

The motivation for doing so would have been obvious based on the teaching of Fellin on page 2 paragraph [0014], "That is why the sequence number associated with the data item is hereinafter referred to as last_modified. The last_modified counter is stored in a non-volatile

storage device, which is non-volatile memory in the preferred embodiment, to prevent its loss upon a replica failure."

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention having the teachings of Fujibayashi and Fellin before him/her to combine Fellin and Fujibayashi for the benefit of having data received by a third storage system from either a first or second storage system given with a sequence number and stored in the order of that sequence to obtain the invention as specified in claim 6.

With respect to **claims 7 and 18,**

Fujibayashi teaches "A remote copy system according to Claim 6..." as stated supra.

Fujibayashi, however, does not disclose expressly "...wherein: said management information, which said second storage system receives from said first storage system, further includes a sequence number whose value is larger by one, than a newest sequence number given to data that said first storage system receives from the host computer: and said second storage system gives sequence numbers to write data received from the host computer, with an initial value of said sequence numbers being the sequence number included in the management information received from said first storage system" (Note: Fujibayashi, as stated

previously, does disclose sending management information from a first storage system to a second storage system).

Fellin discloses, "Sequence numbers are integers, which are assigned by the source in increasing order, preferably in increments of one without gaps, to read and write requests. Separate consecutive sequences are assigned to read requests and write requests. The assigned sequence number of a write request is sent to each replica, and it is stored by the replica in association with the data item that was modified by the write request. In other words, the sequence number associated with a particular data item is the sequence number of the last write request that modified that data item" (page 2 paragraph [0014]).

Fujibayashi and Fellin are analogous art because they are from the same field of endeavor, that being data replication between storage devices.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate a remote copy system of claim 6 in which the management information received by second storage system from a first storage system is given with a sequence number whose value is larger by one, than the newest sequence number given to data that said first storage system receives from the host computer, and second storage system gives sequence numbers to write data received from the host computer to arrive at claim 7.

The motivation for doing so would have been obvious based on the teaching of Fellin on page 2 paragraph [0014], "That is why the sequence number associated with the data item is hereinafter referred to as last_modified. The last_modified counter is stored in a non-volatile storage device, which is non-volatile memory in the preferred embodiment, to prevent its loss upon a replica failure."

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention having the teachings of Fujibayashi and Fellin before him/her to combine Fellin and Fujibayashi for the benefit management information that is received by second storage system from a first storage system is given with a sequence number whose value is larger by one, than the newest sequence number given to data that said first storage system receives from the host computer, and second storage system gives sequence numbers to write data received from the host computer to obtain the invention as specified in claim 7.

Response to Arguments

Applicant's arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection. New grounds of rejection necessitated by applicant's amendments to the claims.

CONCLUSION

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time

policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the mailing date of this final action.

Direction of Future Correspondences

Any inquiry concerning this communication or earlier communication from the

examiner should be directed to Horace L. Flournoy whose telephone number is (571)

272-2705. The examiner can normally be reached on Monday through Friday 8:00 AM

to 5:30 PM (ET).

Important Note

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Reginald G. Bragdon can be reached on (571) 272-4204. The fax phone

numbers for the organization where this application or proceeding is assigned is (703) 746-7239.
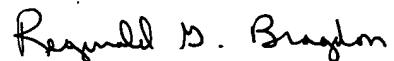
Information regarding the status of an Application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or PUBLIC PAIR. Status information for unpublished applications is available through Private Pair only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-2100.

Horace L. Flournoy

Patent Examiner

Art unit: 2189

REGINALD G. BRAGDON
PRIMARY EXAMINER
Supervisory Patent Examiner

Technology Center 2100